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(71) Applicant: JUJO PAPER CO., LTD.
4-1, Oji 1-chome
Kita-ku Tokyo 114 (JP)

(72) Inventor: Kano, Isao, C/o Central Research Lab.
Jujo Paper Co., Ltd., 21-1, Oji 5-chome, Kita-ku Tokyo (JP)
Inventor: Fujiwara, Hideki, Central Research Lab.
Jujo Paper Co., Ltd., 21-1, Oji 5-chome, Kita-ku Tokyo (JP)
Inventor: Matsunaga, Katsuhiko, Central Research Lab.
Jujo Paper Co., Ltd., 21-1, Oji 5-chome, Kita-ku Tokyo (JP)
Inventor: Hata, Kunio, Central Research Lab.
Jujo Paper Co., Ltd., 21-1, Oji 5-chome, Kita-ku Tokyo (JP)

(74) Representative: Myerscough, Philip Boyd et al
J.A. Kemp & Co. 14 South Square, Gray's Inn
GB-London WC1R 5LX (GB)

(54) Coated printing paper and process for producing the same.

(57) A coated printing paper comprising a substrate bearing on one or both sides a pigment layer and a surface-layer of a thermoplastic latex polymer having a second-order transition temperature of at least 80°C, the or each surface-layer having been treated by a calender at a temperature less than the second-order transition temperature of the polymer. The coated printing paper has good printability and high gloss.

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COATED PRINTING PAPER AND PROCESS FOR PRODUCING THE SAME

The present invention relates to a process for producing a coated high-gloss paper having a superior printability.

A coated papers having a coated-layer composed of pigment and binder are used as a high grade printing paper, wherein the gloss of the surface of a coated layer is an important factor besides a printability including ink-absorbency, coated-layer strength, etc. For enhancing the gloss, however, the smoothing by a press on the surface of a coated layer causes the destruction of voids in the coated-layer, thereby lowering the ink-absorbency. And for enchancing the gloss, the use of a large amount of water-soluble or -dispersible polymer, such as polymeric latex, which is used as the binder for pigment, increases a coated-layer strength and gloss, but lowers an ink-absorbency owing to the decreased voids in a coated-layer. Accordingly, the gloss and the printability have adverse tendency in this case. As described above, the kinds and amounts of pigment and binder, the amount of coating material, the degree of smoothing treatment and the like are determined under the consideration of an appropriate balance of gloss and printability. Therefore, other techniques are required for the production of a high gloss paper having a superior printability.

The gloss value of the coated printing paper is generally increased in the following order: slightly coated paper, coated paper, art paper, superart paper and cast-coated paper. "High gloss" of the present invention means a higher gloss value than that of superart papers. Accordingly, "a high gloss paper" means a coated printing paper having a high gloss value than that of superart paper. Conventionally, a method using cast-coater is known as a method for the production of high gloss papers, wherein a wet coated-layer composed of pigment and binder is press-contacted with a cast-drum of mirror finishing and dried under heating. This method has a problem including a remarkably slower production speed compared with conventional art papers, coated papers or slightly coated papers.

Further, a method using a heated calender without using cast-drums is well-known. For example, Japanese Patent Laid-Open Application No.56-68188, Japanese Patent Publication Nos 64-10638 and 64-11758 disclose a method for coating a mixture of pigment and polymeric latex or water-soluble polymer, drying a resultant coated-layer and further treating the coated layer with a heated calender. In this case, the polymeric latex having a glass transition temperature of at least 5°C or at least 38°C is selected as the used latex, and the temperature of a heated calender is set at a higher temperature than the glass transition temperature of the used latex. Since this method selects a latex and calender treatment, it is simplified, superior in productivity, but it has as a defect an insufficient gloss, that is, this method does not provide a higher gloss than that of superart papers, and therefore it does not provide the same gloss as that of cast-coated papers.

As another method, further, there is a method disclosed in Japanese Patent Laid-Open Application No.59-22683. This method comprises coating a combination of at least two polymeric latexes of various minimum film-forming temperatures on an uncoated sheet or on a casted sheet, drying the obtained sheet and optionally smoothing the sheet by a calender. In this case, the drying of the combined lateces of various minimum film-forming temperatures causes fine crackings on the surface of the coated paper, thereby resulting in a superior ink-absorbency without impairing the gloss. The important point of the above technique consists in causing fine cracks on the surface of the coated sheet, wherein the special care about the drying conditions must be exercised. That is, the drying conditions must be set so as to completely melt the latex of a lower minimum film-forming temperatuer and, partly melt the latex of a higher minimum film-forming temperature. However, as is well-known, the drying conditions are easily varied by many factors. Considering industrial application of this technique, it is practically impossible to keep the drying conditions uniform and conatant over an entire production system. Therefore, it is very difficult to maintain the constant stable quality.

It is the primary purpose to provide a coated printing paper having both superior printability and high gloss. It is the secondary purpose to provide a process for producing easily and inexpensively a coated printing paper having both superior printability and high gloss.

The primary purpose can be achieved by using a coated printing paper which comprises forming on a substrate a pigment-coated layer and then superposing thereon a surface-layer consisting of thermo-plastic polymeric latex of a second-order transition temperature of at least 80°C, wherein the surface-layer is treated by a calender at a less temperature than the second-order transition temperature. The secondary purpose can be achieved by using a process which comprises forming on a substrate a pigment-coated layer, coating thereon a thermoplastic polymeric latex of a second order transition temperture of at least 80°C to prepare a surface-layer, drying the and then treating the surface-layer by a calender at a less temperature than the second-order transition temperature.

FIG. 1 shows an electron-microphotograph of the surface of the coated printing paper in Example 1.

As printing base-materials, there are generally used papers, synthetic papers, plastic films, non-woven

clothes and the like. Among the above materials, papers are employed in the wide range. The paper are classified into pigment-coated papers, such as art paper, coated paper, slightly coated paper, coated white board, etc, and into non-coated papers, such as wood-free paper, wood-containing paper, newsprint paper, glazed paper, supergravure paper, etc. In order to provide both high gloss and superior printability, the base-material of the present invention including a coated-layer should be selected from the above base-materials.

The substrate of the present invention includes all of the substrate forming thereon a pigment-coated layer, but wood-containing paper and wood-free paper, etc. are suitable for this substrate. The process for forming a pigment-coated layer on an uncoated paper is sufficiently carried out by the conventional process for producing a pigment-coated paper, but the pigment in coating material, the kind of binder, the ratio of bindert to pigment are varied depending upon the desired quality. Two- or one- side coated paper (having a coating weight of 2-40 g/m^2.side) is used as the pigment coated-paper of the present invention. After the pigment-coating, a thermoplastic polymeric latex is coated on the pigment-coated layer to prepare a surface-layer. Before the latex-coating, the pigment-coated layer can be optionally smoothed by means of a super calender, gloss calender and the like.

The coating of thermoplastic polymeric latex on an uncoated paper (as base-material) provide a good printability, but not high gloss.

The coating of thermoplastic polymeric latex on a synthetic paper or plastic film.(as base-material) provide a worse printability (an insultable effect) owing to the insufficient dryability.

The thermoplastic polymeric latex used in the present invention is an emulsion of thermoplastic polymer or copolymer (hereinafter referred to as "polymeric latex") and has a second-order transition temperature of at least 80°C. In a core-shell type latex, shell part should indicate a second-order transition temp-erature of at least 80°C. The polymer-lateces having a second-order transition temperature of at least 80°C are used in the present invention regardless of the monomer species and the production process. In this case, preferable monomers include, for example, styrene, derivatives thereof, vinilidene chloride, acrylate or methacrylate.

The upper limit of the second-order transition temperature is not otherwise limited, but is substantially determined depending upon the monomer species, and the additives such as plastisizer for producing the polymeric latex. In general, this upper limit is about 130°C.

The use of the polymeric latex having a second-order transition temperature below 80°C causes an adhesion to the calender roll in the calender treatment, and it provides a coated paper with insufficient gloss, low surface strength and worse printability.

In this case, the purpose of the present invention is not achieved due to the above defects.

In general, the particle size of latex used for the paper-coating is smaller than that of the latex used for other field like paint. It is an average particle size of 100-500 nm. However, it seems that the polymeric latex having an average particle size of less than 100 nm is preferable in the present invention.

The polymeric latex of the present invention is coated alone on a pigment coating layer. In this case, various additives are added thereto in the range free of harming the purpose of the present invention. These additives are as follows : natural or synthetic coating-binders, fluidity-adjusting agents for the controll of coating suitability, antifoamers, lubricants for the adhesion to calender rolls, coloring agents for the coloration of a coating layer surface, a small amount of pigments, and the like. The above additives may be mixed appropriately to prepare a coating material for a surface-layer.

The resultant coating material for the surface-layer is coated on a pigment-coated layer to produce a surface-layer. The coating amount can be suitably adjusted to obtain a desired quality. With the large amount of the coating, the costs are increased, the ink absorbency is reduced, the ink set is insufficient, and the strength of the surface-layer is lowered. Accordingly, the large amount of the coating is disadvantageous. In ordinary cases, it is suitable to use a coating amount of at least 0.1 g/m^2, preferably 0.3-3 g/m^2 on one side of a coated paper.

The coating material for the surface-layer is applied by means of a conventional coater used in paper coating, for example, blade coater, roll coater, air-knife coater, bar coater, gravure coater, flexo coater and the like. The drying after the coating, if the polymeric latex of the present invention is used, requires no specific equipment, and it is carried out by the conventional drying systems used for the production of coating papers.

Then, the obtained surface-layer is treated by a calender to prepare a high gloss-layer. The kind of calenders is not otherwise limited, and super-calender and/or gloss-calender used for smoothing a coated paper are generally employed. However, the calender-treatment, of which the conditions are important, must be made at below the second-order transition temperature of the polymeric latex used for a surface-layer. Any temperature below the second-order transition temperature can be used. However, its temperature is preferably the at least 5°C lower temperature, more preferably the 10°-30°C lower temperature, than the second-order transition temperature.

It is unknown why the coated printing paper of the present invention has both superior printability and high

gloss. However, it can be assumed from the observation of the glazed surface-layer of the present invention as follows.

Fig. 1 shows an electron-microscopic photograph of the surface-layer of the coated printing paper used in the present invention. As seen in Fig. 1, the surface-layer does not consist of an continuously uniform film formed by melting a polymeric latex, but constitutes a structure in which the polymeric latex particles of several ten nano meter are separated from each other. This fact means that the polymeric latex, owing to its high second-order transition temperature of at least 80°C, is fixed under holding the form and size of latex-particles without melting and without forming a continuous film, under the conventional drying conditions and the subsequent calender treatment, which is made below a second-order transition temperature. Accordingly, there are many voids between polymeric latex particles, so that the printing inks are filled in the voids and pass through the capillary tubes among the particles. The passed ink reaches the pigment-coated layer, where it is absorbed.

According to the usual theory, it is concluded that the latex holding the form and size of latex-particles without melting as shown in Fig. 1 has no film strength. On the contrary, the glazed surface-layer of the present invention has practically sufficient strength. The reason for the sufficient strength is now unknown, but it is assumed that the polymeric latex having a second-order transition temperature of 80°C has a certain hardness in a calender treatment. Accordingly, the calender treatment after the coating of this latex on the pigment-coated layer causes complicated actions of the properties, such as packing, elasticity, etc. of a pigment-coated layer, the properties of the polymeric latex determined by hardness, particle size, coating amount, etc., and the mutual chemical affinities of latex, under a high pressure of the calender treatment. That is, it is assumed that the increase of the surface strength, is due to the above complicated actions, i.e. the so-called mechanochemical effects.

Considering the conventional view that the practicably uniform continuous surface is required for obtaining a high gloss, it is not expected that the surface of the layer coated with the polymeric latex provides a high gloss inspite of holding the particle form. This reason seems to be as follows. The particle size of the polmeric latex is small, and the cavities in the pigment-coated layer are filled with the polymeric latex, so that a whole surface-layer is optically smoothed.

Considering that the surface-layer of a coated printing paper in Comparative Example 1 described hereinafter holds the state of a particle size of the polymeric latex as seen in Table 1, it is assumed that the other factors relate to the mechanism of the effects of the present invention. However, it is unknown what these factors are.

Since, in the production of a coated printing paper, the drying and calendering conditions are equal to those in case of the commercial coated papers, a coated paper having a certain standard quality is produced without damaging the productivity.

The following examples serve to illustrate the present invention in more details although the present invention is not limited to the examples. Unless otherwise indicated, all parts and percentages are by weight.

Examples

The production of polymeric latex for over-coating

Preparation Example 1

300 parts of water, 9 parts of sodium dodecylbenzene sulfonate and 4 parts of polyoxyethylene nonyl phenol ether (10 moles of ethylene oxide addition) were placed in a four-necks flask equipped with a stirrer, a thermometer, a cooler, a dropping funnel and a nitrogen gas inlet, and then were mixed to prepare a mixed substance. On the other hand, 80 parts of styrene, 10 parts of α-methylstyrene, 100 parts of methyl methacrylate were mixed to prepare a monomer mixture. 60 parts of the monomer mixture were added to the mixed substance, and were heated to 60 C under substituting with nitrogen. Further, 7.2 parts of 20% aqueous ammonium persulfate solution and 4.8 parts of 20% anhydrous sodium bisulfite solution were added thereto and polymerized for 60 minutes. After adding 10 parts of 20% aqueous ammonium persulfate solution, 140 parts of the above monomer mixture were added dropwise thereto for one hour, and were maintained at 90°C for 4 hours. After the completion of polymerization, a copolymeric latex of ethylenic monomer having a second-order transition temperature of 107°C and a solid content of 39% was obtained.

Preparation Example 2

310 parts of water, 5.6 parts of ammonium polyoxyethylene nonyl phenyl ether sulfate (HITENOL N-03, manufactured by DAI-ICHI KOGYO SEIYAKU CO., LTD), 48 parts of styrene, 19 parts of methyl methacrylate, 8 parts of ethyl methacrylate, 2.5 parts of divinyl benzene and 2.5 parts of methacrylic acid were placed in a four-necks flask equipped with a stirrer, a thermometer, a cooler, a dropping funnel, and were heated to 70°C under substituting with nitrogen. 5 parts of 16% aqueous potassium persulfate solution were added thereto and maintained at 85°C for 4 hours. After the completion of polymerization, a copolymeric latex (B) of ethylenic monomer having a second-order transition temperature of 85°C and a solid content of 21.2% was obtained.

Preparation Example 3

The same procedure as that of Preparation Example 1 was carried out except that 88 parts of styrene, 38 parts of methylmethacrylate, 70 parts of n-butylmethacrylate and 4 parts of methacrylic acid were used instead of the monomer of Preparation Example 1, wherein a copolymeric latex having a second-order transition temperature of 68°C and a solid content of 39%.

Preparation of a base material (a coated-paper)

70 parts of 1st class kaolin, 30 parts of fine ground calcium carbonate, 13 parts (solid content) of styrene-butadiene copolymeric latex and 5 parts (solid content) of a 35% aqueous starch solution were mixed to produce a coating color of a 64% solid content. The coating color was coated on a wood-free base paper of a basis weight of 127 g/m² in a coating amount of 14 g/m² side (dry basis) by means of a blade coater with a coating speed of 500 m/min. After drying, a base material of a 5.5% moisture content for upper-coating (a pigment-coated paper) having a pigment-coated layer was obtained.

Examples 1, 2 and 3, and Comparative Example 1

90 parts (solid content) of a copolymeric latex having a second-transition temperature of 107°C, 5 parts (solid content) of polyethylene wax emulsion-type releasing agent and 5 parts (solid content) of calcium stearate-type lubricant were mixed to produce an upper-coating solution of a 30% solid content. The resultant coating solution was coated in a coating amount of 1.6 g/m² side (dry basis) on a base material (pigment-coated paper). After drying, an upper-coated paper of a 6.5% moisture content was obtained. The resultant coated paper was treated under a nip pressure of 180 kg/cm through two nip of a supercalender consisting of chilled rolls and cotton rolls so as to contact the upper-coated surface with the metal roll. In this manner, a coated paper having a high gloss was obtained. Examples 1 and 2 were made at chilled roll temperatures of 65°C and 82°C, respectively. On the other hand, an upper-coated paper was treated under a nip pressure of 1000 kg/cm through two nip of a gloss calender consisting of chilled rolls and heat-resistant rolls so as to contact the upper-coated surface with the metal roll. Example 3 was made at a chilled roll temperature of 95°C, and Comparative Example 1 was made at a chilled roll temperature of 120°C, i.e. a higher temperature than a second-order transition temperature of copolymeric latex.

Examples 4, 5 and 6

An upper-coated solution and base paper in Example 2 were used, and supercalendering conditions, including a roll temperature of 82°C, were made in the same manner as in Example 2, wherein one to several time coatings were made by means of a blade coater (manufactured by Kumagaya Riki Co,) to produce a paper having a high gloss. Examples 4, 5 and 6 had upper-coated weights of 0.7 g/m², 2.8 g/m² and 5.5 g/m², respectivity.

Examples 7 and 8, and Comparative Example 2

Examples 7 and 8, and Comparative Example 2 were carried out in the same manner as in Examples 1-3, and Comparative Example 1, except for using a 20% coating solution which contents 80 parts (solid content) of the copolymeric latex (B) having a second-order transition temperature of 85°C, 10 parts (solid content) of polyethylene wax-type lubricant and 10 parts (solid content) of calcium stearate-type lubricant and except for using a coating amount of 1.2 g/m² side (dry basis). In this manner, upper-coating papers of high gloss were obtained. Examples 7 and 8 were carried out at chilled roll temperatures of 65°C and 82°C, respectively, (lower temperature than a second-order transition temperature of copolymeric latex), and Comparative Example 2 was carried out at a chilled roll temperature of 120°C, a higher temperature than the second-order transition temperature of the copolymeric latex.

Comparative Examples 3 and 4

Comperative Examples 3 and 4 were carried out in the same manner as in Examples 1 and 3, except for using the copolymeric latex having a second-order transition temperature of 72°C and a coating amount of 1.4 g/m² side (dry basis), wherein high gloss papers were obtained. Comparative Example 3 was made at a chilled roll temperature of 65°C, lower a temperature than the second-order transition temperature. Comparative Example 4 was made at a chilled roll temperature of 95°C, a higher temperature than the second-order transition temperature.

Comparative Example 5

An upper-coating solution of Example 7 using the copolymeric latex (B) was coated on an uncoated wood-free paper of a 127 g/m² bisis weight in a coating amount of 2.6 g/m² side and was treated in the same manner as in Example 7 by means of a super-calender consisting of chilled rolls and cotton rolls adjusted at a temperature of 82°C, wherein an upper-coated paper was obtained.

Comparative Example 6

On the base material having a pigment-coated layer used in Example 1-3, there was coated a 30% upper-coating solution composed of 70 parts (solid content) of the copolymeric latex(B), 25 parts (solid content) of the pigment-coated material used for application of the pigment-coated layer on the base material and 5 parts

(solid content) of calcium stearate type lubricant in a coating amount of 8.7 g/m² side. The resultant upper-coated paper was treated in the same manner as in Example 8 by means of calender to prepare a high gloss paper.

The coated-paper obtained in Examples and Comparative Examples were tested and evaluated for their qualities. The test results, with the copolymeric lateces and the surface temperature of metal rolls in the calender-treatment in Examples and Comparative Examples were shown in Table 1.

Table 1

	Base paper	Kind of upper-coating resin (Tg °C)	Coating amount of upper-coating resin (g/m²)	Kind of calender (Roll Temp.) (°C)	Adhesion to calender	Gloss of unprinting paper Reflectance at 60° %	Printing gloss Reflectance at 75°	Ink setting	Dry picking resistance	Percentage missing dots-number
Example 1	Pigment coated paper	A (107)	1.6	Super (65)	No-adhesion	63.9	89.0 %		High	0.11
Example 2	〃	A (107)	1.6	Super (82)	No-adhesion	71.5	92.2		〃	
Example 3	〃	A (107)	1.6	Gloss (92)	No-adhesion	62.9	88.6		〃	
Comparative Example 1	〃	A (107)	1.6	Gloss(120)	Adhesion	44.7	64.1		Medium	4.30
Example 4	〃	A (107)	0.7	Super (82)	No-adhesion	68.4	90.8		High	
Example 5	〃	A (107)	2.8	Super (82)	No-adhesion	72.3	93.0		〃	
Example 6	〃	A (107)	5.5	Super (82)	Partial adhesion	58.4	85.7		〃	1.25
Example 7	〃	B (85)	1.2	Super (65)	No-adhesion	65.1	87.6		〃	0.11
Example 8	〃	B (85)	1.2	Super (82)	No-adhesion	73.4	95.4		〃	
Comparative Example 2		B (85)	1.2	Gloss(120)	Adhesion	38.8	56.8		Medium	
Comparative Example 3		C (72)	1.4	Super (65)	Partial adhesion	51.3	70.4		Low	3.22
Comparative Example 4		C (72)	1.4	Gloss (95)	Adhesion	32.2	49.5		〃	
Comparative Example 5	Wood-free paper	B (85)	2.6	Super (82)	No-adhesion	15.8	35.5		〃	8.51
Comparative Example 6	Pigment coated paper	B (85) Pigment coating material	8.7	Super (82)	No-adhesion	53.4	80.3		High	0.12

Note: unprinted gloss of art paper and cast coated paper (Reflectance at 60)

Super art (SA Kanafuji) 54.1%
Cast coat (Mirror coat platinum) 63.6%

The test methods and evaluations are as follows.

Gloss of unprinted paper

A gloss is measured by adopting the reflectance at an angle of 60° under the use of Murakami type gloss meter, since the reflectance at an angle of 75° exhibits the fast equal gloss-values in high gloss papers. As the standard gloss of unprinted paper, the reflectances at 60° and 75° are shown in a superart paper (SA) and cast-coated paper (CC).

	Reflectance at 60°	Reflectance at 75°
S A :	54.1%	83.6%
C C :	63.6%	84.7%

S A : Superart paper

C C : Cast-coated paper

Printing gloss

A paper is printed by means of RI-II type printing tester, and is measured by Murakami-type gloss meter under the use of a reflectance at 75°.

Ink setting

A paper is printed by means of RI-II type printing tester. Then, an unprinted paper is contacted with the printed surface. The ink-transfer degree onto an unprinted paper is evaluated by eyes as follows.

o means no ink-transfer onto an unprinted paper

Δ means partial ink-transfer

xmeans remarkable ink-transfer

Gravure printability

A paper was printed by gravure printing tester (manufactured by Kumagaya Riki Co.) under the use of half tone gravure as plate

The percentage (%) of missing dots-number, based on the total number of dots, is indicated.

As is distinct from Table 1, any of the coated printing paper of the present invention has a higher gloss than super-art papers. This coated printing paper is superior or practically available in its printability such as ink setting, dry picking resistance, dots, etc. Further, it is superior or practically available in the adhesion of the polymeric latex to calender rolls, that is, a index of easy productivity.

On the contrary, any of the Comperative Examples has an insufficient gloss, and is inferior or insufficient in some indexes of printability or the adhesion to calender rolls, which means that the purpose of the present invention is not achieved.

Effects

The process of the coated printing paper of the present invention comprises forming on a substrate a pigment-coated layer, coating thereon a thermoplastic polymeric latex of a second-order transition temperature of at least 80°C to prepare a surface-layer, drying the obtained paper, and then treating the surface-layer by a calender at a less temperature than the second-order transition temperature. The process of the present invention provides a higher gloss paper than super-art papers, a practically sufficient printability including ink-setting, surface picking resistance, etc., and a superior productivity without the adhesion of a paper to calender rolls.

Claims

1. A coated printing paper which comprises a substrate bearing on one or both sides a pigment layer and a surface-layer of a thermoplastic latex polymer having a second-order transition temperature of at least 80°C, the or each surface-layer having been treated by a calender at a temperature less than the second-order transition temperature of the thermoplastic latex polymer.

2. A paper according to claim 1, wherein the or each surface layer is obtainable by coating the or each pigment layer with a latex of the thermoplastic latex polymer at a coating rate of 0.3-3 g/m^2.

3. A paper according to claim 1 or 2, wherein the substrate is paper.

4. A paper according to any one of the preceding claims, wherein the coating rate of pigment on the substrate is 2-40 g/m² in the or each pigment layer.

5. A process for producing a coated printing paper which comprises forming a pigment layer on one or both sides of a substrate, coating thereon a latex of a thermoplastic polymer having a second-order transition temperature of at least 80°C to prepare a surface-layer on the or each pigment layer, drying the obtained paper and then treating the or each surface-layer with a calender at a temperature less than the second-order transition temperature of the thermoplastic polymer.

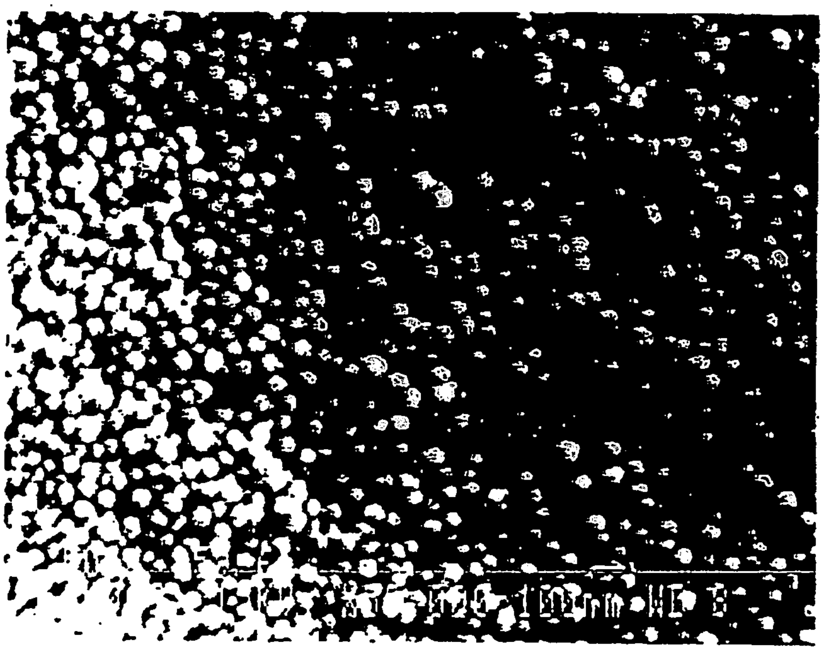
6. A process according to claim 5, wherein the or each surface layer is produced by coating with said latex at a coating rate of 0.3-3 g/m².

7. A process according to claim 5 or 6, wherein the substrate is paper.

8. A process according to any one of claims 5 to 7, wherein the coating rate of pigment on the substrate is 2-40 g/m² in the or each pigment layer.

9. A process according to any one of claims 5 to 8, wherein the or each surface-layer is treated by a calender at a temperature 10-30°C lower than the second-order transition temperature of the thermoplastic latex.

FIG. 1



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EUROPEAN SEARCH REPORT

Application Number

EP 90 30 6132

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	PATENT ABSTRACTS OF JAPAN vol. 12, no. 164 (M-698)(3011) 18 May 1988, & JP-A-62 280067 (CANON) 04 December 1987, * the whole document *	1	D21H19/56 D21H19/58 D21H19/82 D21H19/84 B41M5/00
A	ABSTRACT BULLETIN OF THE INSTITUTE OF PAPER CHEMISTRY, vol 47, nØ8, Feb 1977, page 899, Abstract nØ 8759U, Appleton, Wisconsin, US; & JP-A-49132305 (KANZAKI PAPER) 19-12-1974	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D21H
B41M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06 MARCH 1991	FOUQUIER J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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